



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER OF PATENTS AND TRADEMARKS  
Washington, D.C. 20231  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/803,561	03/09/2001	Tomitaro Hara	09792909-4805	7307

26263 7590 02/13/2003

SONNENSCHN NATH & ROSENTHAL  
P.O. BOX 061080  
WACKER DRIVE STATION  
CHICAGO, IL 60606-1080

EXAMINER

DOVE, TRACY MAE

ART UNIT

PAPER NUMBER

1745

DATE MAILED: 02/13/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/803,561	<b>Applicant(s)</b> HARA ET AL.	
	<b>Examiner</b> Tracy Dove	<b>Art Unit</b> 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1) ☒ Responsive to communication(s) filed on 09 March 2001.

2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4) ☒ Claim(s) 1-12 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.

6) ☒ Claim(s) 1-12 is/are rejected.

7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.

8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

9) ☒ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All    b) ☐ Some    \* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.

2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.

3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application):

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____	4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) 6) <input type="checkbox"/> Other: _____
---	---

## DETAILED ACTION

### *Priority*

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Specification*

The disclosure is objected to because of the following informalities: "a-butyrolactone" appears to be a typographical error (for example page 11 and page 17). Examiner suggests using the correct symbol. Appropriate correction is required.

### *Claim Objections*

Claim 9 is objected to because of the following informalities: "a-butyrolactone" appears to be a typographical error. Examiner suggests using the correct symbol. Appropriate correction is required.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4-6 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 4 recites "said diene compound is contained in an amount of 0.0001 mol to 0.0005 mol to 1 g of said positive electrode active material", which is indefinite. It is unclear what the claim encompasses because in order to determine the amount of the diene compound, the diene compound and the components of the active material would have to be known. The claim should

Art Unit: 1745

recite the same units for measuring the amount of the diene compound and the amount of the active material, otherwise it is not possible to convert between the two units of measurement in claim 4. Claim 4 will be examined as reciting "said diene compound is contained in the positive active material".

Claim 6 recites the electrolyte is "in a gelated state". However, claim 1 (claim 6 depends from) recites "a solid electrolyte". The term "gelated" is used in the art to describe an electrolyte that is at least part solid and at least part liquid. The term "solid" is used in the art to describe an electrolyte that is substantially a solid. It is unclear what form the electrolyte of claim 6 is limited to since "gelated" and "solid" are not equivalent terms for an electrolyte. For the purposes of this Action the claim will be examined as reciting "wherein the solid electrolyte contains a non-aqueous solvent."

To the extent the claims are understood in view of the rejections above, note the following prior art rejections.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, 6, 8, 9, 11 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Takeda et al., US 5,658,687.

Takeda teaches a battery having a positive electrode including a current collector and active material, an electrolyte layer and an anode including a current collector and active

Art Unit: 1745

material (see col. 11, lines 64-col. 12, lines 4). The electrolyte layer contains a high-molecular weight compound (polyethylene glycol/polymer matrix) with an electrolyte salt, for example  $\text{LiPF}_6$  (claim 8) (abstract and col. 8, lines 8-18). As can be seen from Fig. 1 (claims 11,12), the solid electrolyte is between the positive and negative electrodes (acts as separator). A binder containing a cyclic diene, for example cyclopentadiene or 1,3-cyclohexadiene, may be included in the cathode (claim 4) and/or anode (see col. 9, lines 1-13). Non-aqueous solvents (claim 6) for the electrolyte salts, such as propylene carbonate (claim 9), are disclosed in col. 8, lines 40-55.

Thus the claims are anticipated.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Juichi et al, JP 09-035746 in view of Linden, Handbook of Batteries(pgs 36.1-36.3;36.13-36.16).

A machine translation of the Japanese patent has been obtained and a copy is attached.

Juichi teaches a cylindrical (claim 10) nonaqueous electrolyte lithium battery comprising a positive electrode, a negative electrode, a separator and an electrolyte. The positive electrode includes a lithium-containing oxide active material and an aluminum current collector (0012). The negative electrode includes a carbon active material and a copper current collector (0013). The separator (claim 12) includes a polypropylene material and is located between the positive and negative electrodes (0014). Juichi teaches an electrolytic solution including a lithium

Art Unit: 1745

electrolyte salt and a solvent (claim 6) (0016). The solvent may be a mixture of ethylene carbonate, diethyl carbonate (claim 9) and 1,4-cyclohexadiene (claims 2,3) (0021). The electrolytic solution (contains the diene) is poured into the cell containing the positive electrode, negative electrode and separator (0016). The electrolytic solution will inherently disperse throughout the cell, thus, the positive electrode (claim 4), negative electrode and separator will contain the diene compound. The examples teach the lithium salt is  $\text{LiPF}_6$  (claim 8).

Juichi does not explicitly state the electrolyte is a solid polymer electrolyte comprising an electrolyte salt dispersed in a matrix polymer. Juichi does not teach the matrix polymer material of claim 7.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because Linden teaches that lithium batteries are known to have liquid electrolytes and solid electrolytes. Linden teaches that lithium batteries having a carbonaceous negative electrode material and an intercalation cathode material ( $\text{LiCoO}_2$  in the examples of Juichi) may have either liquid organic electrolytes or solid polymer electrolytes (see Fig. 36.1 of Linden). Linden teaches that solid polymer electrolytes provide a safer design because of their lower reactivity with lithium (page 36.2). Linden teaches that a solid polymer electrolyte is formed by incorporating lithium salts into polymer matrices and that solid polymer electrolytes offer the advantage of flexibility of designing batteries in a variety of configurations (page 36.13). The polymer of the solid polymer electrolyte may be polyethylene oxide (page 36.16). One of skill would be motivated to use a solid polymer electrolyte for the lithium battery of Juichi in order to improve the safety and flexibility of the battery. Linden teaches that lithium batteries having a carbonaceous negative electrode material (graphite in the

examples of Juichi) and an intercalation cathode material ( $\text{LiCoO}_2$  in the examples of Juichi) may have either liquid organic electrolytes or solid polymer electrolytes. Thus, the skilled artisan would find the use of a solid polymer electrolyte for the lithium battery of Juichi obvious.

***Allowable Subject Matter***

Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: the claim is directed toward a solid polymer electrolyte battery having a diene compound contained in a positive electrode and the solid electrolyte. The solid electrolyte comprises at least two layers wherein the first layer is formed on the positive electrode and the second layer is formed on the negative electrode. The amount of diene contained in the first layer is not less than 75% of the total content of the first layer.

The prior art does not teach a solid polymer electrolyte having at least two layers wherein a layer formed on a positive electrode has a diene compound contained in the first layer in an amount of not less than 75% of the total content of the first layer.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tracy Dove whose telephone number is (703) 308-8821. The Examiner may normally be reached Monday-Thursday (9:00 AM-7:30 PM). My supervisor is Pat Ryan, who can be reached at (703) 308-2383. The Art Unit receptionist can be reached at

Application/Control Number: 09/803,561

Page 7

Art Unit: 1745

(703) 308-0661 and the official fax numbers are 703-872-9310 (after non-final) and 703-872-9311 (after final).

February 6, 2003



**Patrick Ryan**  
**Supervisory Patent Examiner**  
**Technology Center 1700**